

## AMENDMENTS TO THE CLAIMS

Please amend the claims as set forth below in marked-up form. This listing of claims will replace all prior versions and listings of claims in the application.

1. (Currently Amended) An audio processor for a sound processing system comprising ~~[[two]]~~ a plurality of microphones and an output device, wherein the plurality of microphones is configured to convert a wave into a plurality of electrical signals~~system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter~~, the audio processor comprising:

a first analysis filter coupled to at least one microphone in the plurality of microphones, the first analysis filter being configured to filter at least one electrical signal in the plurality of electrical signals to provide a filtered electrical signal;

a wave parameter estimator coupled to the first analysis filter and the plurality of microphones, connected to the input of the audio processor and comprising at least a first analysis filter connected to at least a first microphone, wherein the at least a first analysis filter creates an input signal in addition to the input signals characterizing the wave and wherein the wave parameter estimator being configured to analyze the filtered electrical signal and the plurality of electrical signals in first and second frequency sub-bands to provide first and second estimates of a parameter of the wave, the first estimate being associated with the first frequency sub-band and the second estimate being associated with the second frequency sub-band~~at least a~~

~~first set of wave parameter estimates for the at least a first frequency band of the input signals;~~  
and

~~a forward filter coupled to the wave parameter estimator and at least one microphone in the plurality of microphones, the forward filter being configured to filter at least one electrical signal in the plurality of electrical signals, the forward filter having a response based on the first and second estimates connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, wherein the forward filter filters the input signals according to the at least a first gain.~~

2. (Currently Amended) The audio processor as defined in claim 1, wherein the ~~at least a first analysis filter~~ is configured to perform~~performs~~ differentiation with respect to time.

3. (Currently Amended) The audio processor as defined in claim 2, wherein the ~~at least a first analysis filter~~ is configured to implement~~uses~~ a difference equation to approximate differentiation with respect to time.

4. (Currently Amended) The audio processor as defined in claim 1, further comprising a second analysis filter, the second analysis filter being configured to filter at least one electrical signals in the plurality of electrical signals~~wherein the wave parameter estimator further comprises at least a second analysis filter connected to the at least a first microphone.~~

5. (Currently Amended) The audio processor as defined in claim 1, wherein the forward filter comprises a forward filter gain controller configured to generate at least a first gain for the first frequency sub-band as a function of the first and second estimates, the forward filter being configured to filter at least one electrical signal in the plurality of electrical signals according at least the first gain~~the wave parameter estimator further comprises at least a second analysis filter connected to at least a second microphone.~~

6. (Original) The audio processor as defined in claim 1, wherein the wave parameter estimator operates in the frequency domain.

7. (Original) The audio processor as defined in claim 1, wherein the wave parameter estimator operates in the time domain.

8. (Currently Amended) An audio processor for a sound processing system comprising ~~[[two]]~~a plurality of microphones and an output device, wherein the plurality of microphones is configured to convert a wave into a plurality of electrical signals~~system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter,~~ the audio processor comprising:

a wave parameter estimator ~~coupledeconnected~~ to the plurality of microphones ~~the input of the audio processor~~ and comprising an equation solver configured to perform~~performing~~ a direct solving technique, wherein the wave parameter estimator is configured to analyze the plurality of electrical signals in first and second frequency sub-bands to provide first and second estimates of a parameter of the wave, the first estimate being associated with the first frequency sub-band and the second estimate being associated with the second frequency sub-band~~generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;~~

and a forward filter coupled to the wave parameter estimator and at least one microphone in the plurality of microphones, the forward filter being configured to filter at least one electrical signal in the plurality of electrical signals, the forward filter having a response that is based on the first and second estimates~~connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, wherein the forward filter filters the input signals according to the at least a first gain.~~

9. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

a wave parameter estimator connected to the input of the audio processor and comprising an equation solver performing an iteration technique, wherein the wave parameter estimator generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

and a forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, wherein the forward filter filters the input signals according to the at least a first gain.

10. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

a wave parameter estimator connected to the input of the audio processor and comprising an equation solver performing a parameter scan technique, wherein the wave parameter estimator generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

and a forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, wherein the forward filter filters the input signals according to the at least a first gain.

11. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

a wave parameter estimator connected to the input of the audio processor and comprising an equation solver performing a solution screening/optimizing for minimal power technique, wherein the wave parameter estimator generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

and a forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, wherein the forward filter filters the input signals according to the at least a first gain.

12. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

a wave parameter estimator connected to the input of the audio processor and comprising an equation solver employing a look up table containing pre-computed solutions, wherein the wave parameter estimator generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

and a forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, wherein the forward filter filters the input signals according to the at least a first gain.

13-15. (Canceled)



16. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

a wave parameter estimator connected to the input of the audio processor, wherein the wave parameter estimator generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

and a forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, the forward filter further includes a statistical evaluator that analyzes the at least a first set of wave parameter estimates in the at least a first frequency band to generate at least one output signal that is input to the forward filter gain controller, wherein the at least one output signal is based on at least one weight that is applied to a wave energy measure and the weighted wave energy measure is low pass filtered.

17. (Withdrawn) The audio processor as defined in claim 16, wherein the at least one weight is based on a difference between a measured direction of sound incidence and a target direction of sound incidence.

18. (Withdrawn) The audio processor as defined in claim 16, wherein the at least one weight is based on a measured wave damping.

19. (Withdrawn) The audio processor as defined in claim 16, wherein the statistical evaluator generates estimates for a noise power of the sound field in the at least a first frequency band.

20. (Withdrawn) The audio processor as defined in claim 16, wherein the statistical evaluator generates estimates for a utility signal power of the sound field in the at least a first frequency band.

21. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

a wave parameter estimator connected to the input of the audio processor, wherein the wave parameter estimator generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

and a forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a look up table containing at least a first predetermined gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, wherein the forward filter filters the input signals according to the at least a first gain.

22. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

a wave parameter estimator connected to the input of the audio processor, wherein the wave parameter estimator generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

a first forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the first forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, wherein the first forward filter filters the input signals according to the at least a first gain;

and a second forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the second forward filter includes a forward filter gain controller for generating at least a second gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, wherein the second forward filter filters the input signals according to the at least a second gain.

23. (Canceled)

24. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

an analysis beamformer connected to the input of the audio processor, wherein the signals from the microphones that characterize the wave are combined using at least one filter;

a wave parameter estimator connected to the output of the analysis beamformer, wherein the wave parameter estimator generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

and a forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, wherein the forward filter filters the input signals according to the at least a first gain.

25-31. (Canceled)

32. (Withdrawn) An audio processor for a sound processing system comprising at least three microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

a wave parameter estimator connected to the input of the audio processor, wherein the wave parameter estimator generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave from the at least three microphones;

and a forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, wherein the forward filter filters the input signals according to the at least a first gain.

33. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

a wave parameter estimator connected to the input of the audio processor, wherein the wave parameter estimator generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

and a forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, the forward filter further includes a gain smoother connected to the output of the forward filter gain controller for preventing the occurrence of abrupt gain changes, wherein the forward filter filters the input signals according to the at least a first gain.

34. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

a wave parameter estimator connected to the input of the audio processor, wherein the wave parameter estimator generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

and a forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, wherein the forward filter gain controller compares at least one wave parameter estimate from the at least a first set of wave parameter estimates to a predetermined threshold value and the forward filter filters the input signals according to the at least a first gain.



35. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

a wave parameter estimator connected to the input of the audio processor, wherein the wave parameter estimator generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

and a forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates including a wave direction parameter estimate, wherein the forward filter filters the input signals according to the at least a first gain.

36. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

a wave parameter estimator connected to the input of the audio processor, wherein the wave parameter estimator generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

and a forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates including a wave damping parameter estimate, wherein the forward filter filters the input signals according to the at least a first gain.

37. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

a wave parameter estimator connected to the input of the audio processor, wherein the wave parameter estimator generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

and a forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, wherein the forward filter gain controller comprises a strategy chooser for selecting an overall gain strategy and the forward filter filters the input signals according to the at least a first gain.

38. (Withdrawn) The audio processor as defined in claim 37, wherein the overall gain strategy is based on a power measurement.

39. (Withdrawn) The audio processor as defined in claim 38, wherein the strategy chooser implements both an omni directional gain strategy and a directional gain strategy selected by comparing a wideband signal power with a wideband noise power, wherein the omni directional strategy is active in all narrow frequency bands covered by wide bands where signal power is greater than a predefined constant times the noise power and in all other bands, the directional strategy is active.

40. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

a wave parameter estimator connected to the input of the audio processor, wherein the wave parameter estimator generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

and a forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, the forward filter includes a forward filter gain controller for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates, wherein the forward filter gain controller comprises a gain function applier for controlling the gain for the at least one wave and the forward filter filters the input signals according to the at least a first gain.

41. (Withdrawn) The audio processor as defined in claim 40, wherein the gain function applier operates by comparing the direction of incidence with a target direction such that when the direction of incidence is within a predefined tolerance from the target direction, then the gain is set to a predefined maximal gain and otherwise the gain is set to a predefined minimal gain.

42. (Withdrawn) The audio processor as defined in claim 40, wherein the gain function applier controls the gain so as to attenuate waves where the absolute value of the wave damping is greater than a predefined threshold.

43. (Withdrawn) The audio processor as defined in claim 40, wherein the gain function applier controls the gain so as to attenuate waves where the value of the wave damping is lower than a predefined threshold.

44. (Currently Amended) An audio processor for a sound processing system comprising ~~[[two]]~~a plurality of microphones and an output device, wherein the plurality of microphones is configured to convert a wave into a plurality of electrical signals ~~system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter~~, the audio processor comprising:

a wave parameter estimator coupled to the plurality of microphones~~connected to the input of the audio processor~~, wherein the wave parameter estimator is configured to analyze the plurality of electrical signals in first and second frequency sub-bands to provide first and second estimates of a direction of the wave, the first estimate being associated with the first frequency sub-band and the second estimate being associated with the second frequency sub-band~~generates at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave and the wave parameter estimator being configured to disregard~~~~disregards the amplitude information of the input signals during the generation of~~ ~~[[a]]~~the first and second estimates of the direction of the wave~~direction estimate~~;

and a forward filter coupled to at least one microphone in the plurality of microphones and ~~connected both to the input of the audio processor and to the output of the wave parameter estimator~~, the forward filter ~~includes~~including a forward filter gain controller for generating at least a first gain for the first frequency sub-band~~at least a first frequency band~~ as a function of the first and second estimates of the direction of the wave~~at least a first set of wave parameter estimates~~, wherein the forward filter filters ~~the input~~at least one of the plurality of electrical signals according to ~~[[the]]~~ at least ~~[[a]]~~the first gain.

45. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

a wave parameter estimator connected to the input of the audio processor and comprising an equation solver employing a look up table containing pre-computed solutions for wave gains, wherein the wave parameter estimator generates at least a first wave gain for the at least a first frequency band of the input signals characterizing the wave;

and a forward filter connected both to the input of the audio processor and to the output of the wave parameter estimator, wherein the forward filter filters the input signals according to the at least a first wave gain.

46. (Currently Amended) A method of audio signal processing for a system comprising ~~[[two]]~~ a plurality of microphones and an output device ~~wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter~~, the method comprising:

converting a wave into a plurality of electrical signals;

filtering a first electrical signal in the plurality of electrical signals to provide a filtered electrical signal ~~creating at least a first analysis filter input signal in addition to the input signals characterizing the wave;~~

analyzing the plurality of electrical signals in first and second frequency sub-bands to provide first and second estimates of a parameter of the wave, the first estimate being associated with the first frequency sub-band and the second estimate being associated with the second frequency sub-band ~~generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals;~~

generating at least a first gain for the first frequency sub-band ~~at least a first frequency band as a function of the at least a first set of wave parameter estimates~~ first and second estimates;

and filtering at least one of the plurality of electrical signals ~~the input signals~~ according to ~~[[the]]~~ at least ~~[[a]]~~ the first gain.



47. (Currently Amended) The method as defined in claim 46, wherein the filtering the first electrical signal to provide the filtered electrical signal is performed ~~the at least a first analysis filter input signal is created~~ through differentiation with respect to time.

48. (Original) The method as defined in claim 47, wherein the differentiation with respect to time is approximated using a difference equation.

49. (Currently Amended) The method as defined in claim 46, wherein one of the first and second estimates~~set of wave parameter estimates~~ is a wave frequency estimate.

50. (Currently Amended) The method as defined in claim 46, wherein one of the first and second estimates~~set of wave parameter estimates~~ is a wave amplitude estimate.

51. (Currently Amended) The method as defined in claim 46, wherein one of the first and second estimates~~set of wave parameter estimates~~ is a direction of sound incidence estimate for the wave.

52. (Currently Amended) The method as defined in claim 46, wherein ~~wherein~~ one of the first and second estimates~~set of wave parameter estimates~~ is a wave damping estimate.

53. (Currently Amended) The method as defined in claim 46, wherein the analyzing the plurality of electrical signals~~generating at least a first set of wave parameter estimates~~ is performed in the frequency domain.

54. (Currently Amended) The method as defined in claim 46, wherein the analyzing the plurality of electrical signals~~generating at least a first set of wave parameter estimates~~ is performed in the time domain.

55. (Currently Amended) A method of audio signal processing for a system comprising ~~[[two]]~~ a plurality of microphones and an output device, ~~wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter,~~ the method comprising:

converting a wave into a plurality of electrical signals;

analyzing, through the use of a direct solving technique, the plurality of electrical signals in first and second frequency sub-bands to provide first and second estimates of a direction of the wave, the first estimate being associated with the first frequency sub-band and the second estimate being associated with the second frequency sub-band~~generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave through the use of a direct solving technique;~~

generating at least a first gain for the at least a first frequency band~~sub-band~~ as a function of the first and second estimates~~at least a first set of wave parameter estimates;~~

and filtering at least one of the plurality of electrical signals~~the input signals~~ according to ~~[[the]]~~ at least ~~[[a]]~~ the first gain.

56. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave through the use of an iteration technique;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and filtering the input signals according to the at least a first gain.

57. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave through the use of a parameter scan technique;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and filtering the input signals according to the at least a first gain.

58. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave through the use of a solution screening/optimizing for minimal power technique;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and filtering the input signals according to the at least a first gain.

59. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave through the use of a look up table containing pre-computed solutions;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and filtering the input signals according to the at least a first gain.

60-62. (Canceled)

63. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

low pass filtering the at least a first set of wave parameter estimates in the at least a first frequency band to generate at least one low pass filtered signal;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates and the at least one low pass filtered signal;

and filtering the input signals according to the at least a first gain.

64. (Withdrawn) The method as defined in claim 63, wherein one of the at least a first set of wave parameter estimates is a wave power estimate that is low pass filtered.

65. (Withdrawn) The method as defined in claim 64, further comprising weighing the wave power estimate before low pass filtering.

66. (Withdrawn) The method as defined in claim 65, wherein weighing is based on a difference between a measured direction of sound incidence and a target direction of sound incidence.

67. (Withdrawn) The method as defined in claim 65, wherein weighing is based on a measured wave damping.

68. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

generating at least a first gain by employing a look up table containing at least a first predetermined gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and filtering the input signals according to the at least a first gain.

69. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals that characterize the wave;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

generating at least a second gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

filtering the input signals according to the at least a first gain;

and filtering the input signals according to the at least a second gain.



70. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

preprocessing the signals, from the at least two microphones, that characterize the wave to obtain two sets of preprocessed signals;

converting the first set of preprocessed signals from analog to digital using high resolution;

converting the second set of preprocessed signals from analog to digital using low resolution;

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and filtering the input signals according to the at least a first gain.

71. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

beamforming the signals, from the microphones, that characterize the wave;

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and filtering the input signals according to the at least a first gain.

72-76. (Canceled)

77. (Withdrawn) A method of audio signal processing for a system comprising at least three microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave from the at least three microphones;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and filtering the input signals according to the at least a first gain.

78. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

smoothing the gain to prevent the occurrence of abrupt gain changes;

and filtering the input signals according to the at least a first gain.

79. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

comparing at least one wave parameter estimate from the at least a first set of wave parameter estimates to a predetermined threshold value;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates and the comparison;

and filtering the input signals according to the at least a first gain.

80. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates including a wave direction parameter estimate;

and filtering the input signals according to the at least a first gain.

81. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates including a wave damping parameter estimate;

and filtering the input signals according to the at least a first gain.

82. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

selecting an overall gain strategy;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates and the selected gain strategy;

and filtering the input signals according to the at least a first gain.

83. (Withdrawn) The method as defined in claim 82, wherein selecting the overall gain strategy is based on a power measurement.

84. (Withdrawn) The method as defined in claim 83, wherein the overall gain strategy comprises both an omni directional gain strategy and a directional gain strategy selected by comparing a wideband signal power with a wideband noise power, wherein the omni directional strategy is active in all narrow frequency bands covered by wide bands where signal power is greater than a predefined constant times the noise power and in all other bands, the directional strategy is active.

85. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates by selecting the at least a first gain from a finite set of predefined gain values;

and filtering the input signals according to the at least a first gain.

86. (Withdrawn) The method as defined in claim 85, wherein one wave parameter of the at least a first set of wave parameter estimates is a direction of incidence parameter and selecting comprises comparing the direction of incidence with a target direction such that when the direction of incidence is within a predefined tolerance from the target direction, then the gain is set to a predefined maximal gain and otherwise the gain is set to a predefined minimal gain.

87. (Withdrawn) The method as defined in claim 85, wherein the at least a first gain is generated so as to attenuate waves where the absolute value of the wave damping is greater than a predefined threshold.

88. (Withdrawn) The method as defined in claim 85, wherein the at least a first gain is generated so as to attenuate waves where the value of the wave damping is lower than a predefined threshold.

89. (Currently Amended) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first set of wave parameter estimates for the at least a first frequency band of ~~[[the]]~~ input signals characterizing the wave, wherein the at least a first set of wave parameter estimates includes a wave direction estimate that disregards ~~[[the]]~~ amplitude information of the input signals;

generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and filtering the input signals according to ~~[[the]]~~ at least ~~[[a]]~~the first gain.

90. (Withdrawn) A method of audio signal processing for a system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the method comprising:

generating at least a first wave gain for the at least a first frequency band of the input signals characterizing the wave by employing a look up table containing pre-computed solutions for wave gains;

and filtering the input signals according to the at least a first wave gain.



91. (Currently Amended) An audio processor for a sound processing system comprising ~~[[two]]~~ a plurality of microphones and an output device, ~~wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter,~~ the audio processor comprising:

means for converting a wave into a plurality of electrical signals;

means for filtering a first electrical signal in the plurality of electrical signals to provide a filtered electrical signal~~creating at least a first analysis filter input signal in addition to the input signals characterizing the wave;~~

means for analyzing the plurality of electrical signals in first and second frequency sub-bands to provide first and second estimates of a direction of the wave, the first estimate being associated with the first frequency sub-band and the second estimate being associated with the second frequency sub-band~~generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals;~~

means for generating at least a first gain for the first frequency sub-band~~at least a first frequency band as a function of the at least a first set of wave parameter estimates~~ first and second estimates;

and means for filtering at least one of the plurality of electrical signals~~the input signals~~ according to ~~[[the]]~~ at least ~~[[a]]~~ the first gain.

92. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave through the use of a direct solving technique;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and means for filtering the input signals according to the at least a first gain.

93. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave through the use of an iteration technique;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and means for filtering the input signals according to the at least a first gain.

94. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave through the use of a parameter scan technique;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and means for filtering the input signals according to the at least a first gain.

95. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave through the use of a solution screening/optimizing for minimal power technique;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and means for filtering the input signals according to the at least a first gain.

96. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave through the use of a look up table containing pre-computed solutions;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and means for filtering the input signals according to the at least a first gain.

97. (Canceled)

98. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

means for low pass filtering the at least a first set of wave parameter estimates in the at least a first frequency band to generate at least one low pass filtered signal;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates and the at least one low pass filtered signal;

and means for filtering the input signals according to the at least a first gain.

99. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

means for generating at least a first gain by employing a look up table containing at least a first predetermined gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and means for filtering the input signals according to the at least a first gain.

100. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals that characterize the wave;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

means for generating at least a second gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

means for filtering the input signals according to the at least a first gain;

and means for filtering the input signals according to the at least a second gain.

101. (Canceled)

102. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for beamforming the signals, from the microphones, that characterize the wave;

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and means for filtering the input signals according to the at least a first gain.

103. (Canceled)



104. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave from the at least three microphones;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and means for filtering the input signals according to the at least a first gain.

105. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

means for smoothing the gain to prevent the occurrence of abrupt gain changes;

and means for filtering the input signals according to the at least a first gain.

106. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

means for comparing at least one wave parameter estimate from the at least a first set of wave parameter estimates to a predetermined threshold value;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates and the comparison;

and means for filtering the input signals according to the at least a first gain.

107. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates including a wave direction parameter estimate;

and means for filtering the input signals according to the at least a first gain.

108. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates including a wave damping parameter estimate;

and means for filtering the input signals according to the at least a first gain.

109. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

means for selecting an overall gain strategy;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates and the selected gain strategy;

and means for filtering the input signals according to the at least a first gain.

110. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of the input signals characterizing the wave;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates by selecting the at least a first gain from a finite set of predefined gain values;

and means for filtering the input signals according to the at least a first gain.

111. (Currently Amended) An audio processor for a sound processing system comprising two microphones and an output device, wherein the sound processing system is configured to sense ~~senses~~ a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first set of wave parameter estimates for the at least a first frequency band of ~~[[the]]~~ input signals characterizing the wave, wherein the at least a first set of wave parameter estimates includes a wave direction estimate that disregards ~~[[the]]~~ amplitude information of the input signals;

means for generating at least a first gain for the at least a first frequency band as a function of the at least a first set of wave parameter estimates;

and means for filtering the input signals according to ~~[[the]]~~ at least ~~[[a]]~~the first gain.

112. (Withdrawn) An audio processor for a sound processing system comprising two microphones and an output device, wherein the system senses a sound environment in at least a first frequency band and the sound environment has a wave with at least a first wave parameter, the audio processor comprising:

means for generating at least a first wave gain for the at least a first frequency band of the input signals characterizing the wave by employing a look up table containing pre-computed solutions for wave gains;

and means for filtering the input signals according to the at least a first wave gain.

113. (New) A hearing aid comprising:

a plurality of microphones configured to convert a wave into a plurality of electrical signals;

a first filter coupled to at least one microphone in the plurality of microphones, the first filter being configured to filter at least one electrical signal in the plurality of electrical signals to provide a filtered electrical signal;

a wave parameter estimator coupled to the first filter and the plurality of microphones, the wave parameter estimator being configured to analyze the filtered electrical signal and the plurality of electrical signals in first and second frequency sub-bands to provide first and second estimates of a parameter of the wave, the first estimate being associated with the first frequency sub-band and the second estimate being associated with the second frequency sub-band;

a second filter coupled to the wave parameter estimator and configured to filter at least one electrical signal in the plurality of electrical signals, the second filter having a response that is based on the first and second parameters of the wave.

114. (New) A method comprising:

converting a wave into a plurality of electrical signals;

filtering at least one electrical signal in the plurality of electrical signals to provide a filtered electrical signal;

analyzing the filtered electrical signal and the plurality of electrical signals in first and second frequency sub-bands to provide first and second estimates of a parameter of the wave, the first estimate being associated with the first frequency sub-band and the second estimate being associated with the second frequency sub-band;

filtering at least one electrical signal in the plurality of electrical signals based on the first and second parameters of the wave.